

## **Method of Forming Thin SGOI Wafers with High Relaxation and Low Stacking Fault Defect Density**

### **Abstract**

**[0037]** A method of forming a silicon germanium on insulator (SGOI) structure. A SiGe layer is deposited on an SOI wafer. Thermal mixing of the SiGe and Si layers is performed to form a thick SGOI with high relaxation and low stacking fault defect density. The SiGe layer is then thinned to a desired final thickness. The Ge concentration, the amount of relaxation, and stacking fault defect density are unchanged by the thinning process. A thin SGOI film is thus obtained with high relaxation and low stacking fault defect density. A layer of Si is then deposited on the thin SGOI wafer. The method of thinning includes low temperature (550°C-700°C) HIPOX or steam oxidation, in-situ HCl etching in an epitaxy chamber, or CMP. A rough SiGe surface resulting from HIPOX or steam oxidation thinning is smoothed with a touch-up CMP, in-situ hydrogen bake and SiGe buffer layer during strained Si deposition, or heating the wafer in a hydrogen environment with a mixture of gases HCl, DCS and GeH<sub>4</sub>.